

## ***Interactive comment on “Effect assessment of NO<sub>x</sub> and SO<sub>2</sub> control policies on acid species in precipitation from 2005 to 2016 in China based on satellite monitoring” by Xiuying Zhang et al.***

### **Anonymous Referee #1**

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Review of Zhang et al., “Effect assessment of NO<sub>x</sub> and SO<sub>2</sub> control policies on acid species in precipitation from 2005 to 2016 in China based on satellite monitoring”

In this manuscript, Zhang et al., use OMI retrievals to assess the columnar S/N ratios over 12 years in China. They compare the ratios to a collection of observations of S/N ratios in precipitation.

The major strength of this manuscript is it reports on columnar S/N ratios and shows they are consistent with observational trends. That is also its weakness as it does not go sufficiently beyond that to warrant publication at this time in ACP. It would be better suited to a journal that is more policy focused as it does not provide significant

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insights to atmospheric chemistry or physics processes. Further, it is, at present, too long given the limited message of the manuscript. (At times, it appears that steps are taken to lengthen the article needlessly.) Another major issue is that the grammar is also not up to ACP standards, and significant editing will be required. Finally, the title is a bit misleading. The major thrust of the article is to use OMI S and N columnar abundances to assess how the ratio of those columns change, and the relationship to precipitation is done via other observations. Not surprisingly, the trends in the columnar abundances have a similar trend to the observations.

Digging in to the details a bit, the precipitation chemistry data set needs to be better described and documented., particularly discussing the spatial and temporal observational limitations. From what I can tell, much of the evaluation is based on the 474 standard ground observations. This is comparison is probably one of the key take-homes from the article at present. It is not apparent how those 474 locations compare to the “168” records related to the cited Liu et al., publications. This was confusing.

They need to better define their terms and show what was done with respect to the evaluation. They state “Other parameters of relative error (RE) and absolute error (AE) are used to assess the accuracy of the estimated NO<sub>2</sub> by the following function:” but no function(s) are given. They also never show the AE. Further, it is not really apparent what should be taken from their performance evaluation.

As noted, the grammar is rough. For example, each sentence in the first paragraph is incorrect grammatically. I am still not certain what is meant by the “successfully” in “successfully full provincial names” means.

The appropriate term is “evaluation”, not “validation” (throughout). Further, this study does not “confirm”, but “supports” other findings.

They use “might” and other similar terms excessively, probably avoiding saying something more definitive.

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They state “Although the contribution of organic acids to precipitation pH was minor, it could not be neglected, particularly in forest and suburban areas (Stavrakou et al., 2012; Willey et al., 2011).” First, they don’t show it is minor. Next, what is meant by “could not”.

The arbitrary classification of “sulfuric” and “mixed” acid precipitation does not add to the article, and related discussion can be dropped throughout. First, the demarcation is arbitrary. Second, the trend in the split does not add to our understanding of the chemistry or physics. It adds text.

In terms of other places where excessive text appears to be added, there are often long strings of province names. This hurts readability and adds little to the knowledge that is to be transferred. If there are specific characteristics, those should be discussed (look at the paragraph beginning at line 233.)

This article would be more fitting as a note, again more appropriately in a journal more aligned with air quality policy, greatly shortened and retitled (e.g., Trends in OMI S and N columns and comparison to trends in precipitation composition”). The analysis would show the S and N and S/N trends, and the ratio (The current Fig. 4). In addition to being tightened and more focused, the grammar also needs to be addressed before further consideration by this, or other, journals.

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